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Perceived information literacy among undergraduate medical students at a Malaysian public university

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ABSTRACT

Information literacy competency is a crucial asset in the pursuit of knowledge for university students. It is the basis of student-centered learning and the key to academic success. Thus, assessment of students' information literacy will help to enlighten the learning needs of the student in searching, managing, and applying information in the digital era. This study aims to assess the perceived information literacy skills among undergraduate students in the Faculty of Medicine of a public university in Kuala Lumpur. A cross-sectional study was conducted from June to August 2019. The Seven Pillars of Information Skills (SCONUL) was adopted for the measurement of information literacy skills in the present study. The seven pillars are identify, scope, plan, gather, evaluate, manage and present. A total of 315 completed questionnaires consists of four parts: the frequency of searching for information resources; perceived information literacy skills; source of learning and barrier in seeking information. About three-quarters of the students reported a high level of perceived information literacy skills. Among four information literacy domains, literacy on information search is at top of the rank, followed by information communication and dissemination, information processing, and information evaluation. The most frequently searched information resource used was the Internet search engine. The most common source of learning was an information literacy course and, the most common barrier was a limited subscription of full texts article. The students should be encouraged to obtain information from trusted resources such as library online subscribed databases. The students must advance their literacy in information processing and information evaluation. The findings also help to guide the University Library in planning the content for information literacy workshops.

Keywords: Information literacy; Information searches; Undergraduate students

INTRODUCTION

Information literacy is the ability to "recognize when information is needed and can locate, evaluate, and use effectively the needed information" (Association of College and Research Libraries (ACRL) 2013 p. 1). It has become evident that everything that students learned in their field of study cannot be easily understood in a few years in universities. Students can become more independent learners if they are equipped with information literacy. It helps them in adding to critical skills that are necessary for them in learning. Information literacy includes the ability to recognize when information is needed and to start using search strategies that allow them to locate the needed information (American Library Association 2006). Skills of evaluating, synthesizing, and using information appropriately such as ethically and legally are included after it is accessed from the media including electronic or printed sources. Furthermore, as indicated by Armstrong et al. (2005), an information-literate individual will plan strategies for updating self-generated knowledge and recognizes the principles of intellectual freedom and reasonable access to information. Information literacy includes technological literacy, information ethics, online library skills, and critical literacy (Abunadi 2018).

The central mission of higher education institutions is to develop lifelong learners (American Library Association 2006). Colleges and universities need to provide the foundation for continued growth throughout their careers. Information literacy is the key component and contributor to lifelong learning as it enhances students' competency in evaluating, managing, and using information. It is considered by several regional and discipline-based accreditation associations as an important key outcome for college students (American Library Association 2006).

LITERATURE REVIEW

The internet was the most frequently used technology for learning and education among both the younger and older generation (Olson 2011). Maranda, Harding and Kinderman (2016) reported that medical students had the highest percentage of using mobile apps as their resource usage during clerkship, in which web search engines had the highest mean, while the online public access catalog (OPAC) had the lowest mean. The study findings revealed that web sources were the most frequently used ones than OPAC and the book is the only source in print that made the top-five list (Maranda, Harding and Kinderman 2016).

A study conducted among Pakistanis university students reported that those who perceived themselves as good in information literacy skills were more comfortable with basic computing skills and using Internet search engines compared to Higher Education Commission digital library, online indexes and abstracts, advanced searching in databases, and using OPAC (Mahmood 2013). The results revealed that the students were comfortable with the computing of a general nature, but not familiar with specific resources and search methods. Therefore, it showed that there was a lack of information literacy skills in students which can be enhanced through information literacy instructional programs. A study from Massachusetts, USA reported that both undergraduate and graduate nursing students were confident in basic computer knowledge and skills, clinical informatics attitude, and wireless device skills. However, they perceived they were less competent in applied computer skills and clinical informatics roles (Choi and Martinis 2012). Li et al. (2022) revealed that Chinese nursing students had the highest information literacy score in information awareness and the lowest in information skills, furthermore, the study

indicated that they received training in medical statistics and literature retrieval where utilization was independently associated with information literacy scores.

According to Pinto (2011), Spanish University students preferred self-learning; the students recognized high levels of motivation toward information literacy but their levels of self-efficacy proved significantly lower. The students faced difficulty with the technological side of the processing category: using database managers and bibliographic reference managers, handling statistical programs and spreadsheets, and installing computer programs. On the other hand, Canadian medical students perceived the barriers to resource usage were remote access and the least perceived barriers were peer pressure and uncertainty about the reliability of information resources (Maranda, Harding and Kinderman 2016). A study among Iranian faculty members reported that factors such as not being skillful in searching the electronic information, not having access to English databases or digital libraries, not distinguishing valid sources from unreliable ones on the Internet, and not being proficient were the major obstacles of the students in seeking information (Mahdian and Shahbazi 2012). Greek nursing students claimed that lack of time, high costs, internet access limitations, and lack of fluency with foreign languages and the use of databases were the major obstacles in seeking information (Intas et al. 2017).

Based on the literature, most of the study findings reported university students perceived good information literacy skills; however medical and health sciences-related students are expected to be competent in applied computer skills and ability to master their clinical informatics role in health care practice. Evidence-based medicine integrates clinical experience and patient values with the best available research information. Evidence-based medicine and evidence-based practice are the gold standards to ensure quality patient care (Sackett 1966). As knowledge and practice in the healthcare field grow every day, the previously accepted facts and practice rapidly become obsolete. Therefore, information literacy skills should be sharpened among the medical and health sciences-related students throughout the training duration. This is to prepare future healthcare professionals to keep pace with the constantly changing and evolving nature of clinical practices.

OBJECTIVES AND METHODS

This study aimed to determine the perceived information literacy among undergraduate students in the Faculty of Medicine of a public university in Malaysia. The specific objectives were:
(a) to assess the frequency of searching for information resources;
(b) to identify the source of learning of information literacy; and
(c) to identify the barrier to seeking information.

The Seven Pillars of Information Skills model introduced by the Society of College, National and University Libraries (SCONUL 1999) was adopted for the measurement of information literacy skills in the present study. This model defines the core skills and competencies (ability) and attitudes and behaviours (understanding) at the heart of information literacy development in higher education. The model is conceived as a three-dimensional circular "building", founded on an information landscape that comprises the information world as it is perceived by an individual at that point in time. The seven pillars are identify, scope, plan, gather, evaluate, manage and present. Each pillar is further described by a series of statements relating to a set of skills/competencies and a set of attitudes/understandings.

Pinto (2010) developed the IL-HUMASS tool based on the Seven Pillars of Information Skills model that consisted of 26 items grouped into four domains (information search, assessment, processing, and communication/dissemination). The present study adapted IL-HUMASS to measure the students' information literacy skills.

The research approach for this study was a cross-sectional quantitative one. The study was conducted at a public university in the city of Kuala Lumpur, Malaysia. The target population for this study was the undergraduate students in the Faculty of Medicine, which consists of students from Bachelor of Medicine and Bachelor of Surgery (MBBS), Bachelor of Nursing Science, and Bachelor of Biomedical Science. There were 751, 54, and 170 undergraduate students for MBBS, Nursing, and Biomedical Science respectively. The total estimated sample size was 276 students based on a sample size calculator (Raosoft 2004) with a confidence level of 95%. An additional 20% was factored into account for potential incomplete responses, resulting in a final estimated sample size of 331. The researcher divided the students into subgroups according to each course. The sampling method used by the researcher was a proportional stratified random sampling method for MBBS and Biomedical Science students, and the universal sampling method was used for nursing students in view of the population being small. A convenience sampling method was used to approach and collect the data from students. Participants are chosen based on their accessibility to the research. It was the easiest and least expensive sampling method to be implemented. Nonetheless, it had its disadvantages; the result that was derived was lack generalizability except for the sample studied. The inclusion criteria were the undergraduate Malaysian students of the Faculty of Medicine which consists of Bachelor of Medicine and Bachelor of Surgery, Bachelor of Nursing Science, and Bachelor of Biomedical Science. The international students were excluded from the study to circumscribe a more homogeneous population that is representative of Malaysian university students.

This study used a self-administered questionnaire for data collection. The questionnaire consists of items adapted from previous studies by Pinto (2011) and Intas et al. (2017). Minor corrections and fine-tuning of the questionnaire were done to address the comments and suggestions from a panel of experts (two librarians and one nursing lecturer) and participants during questionnaire validation and pilot study, respectively, to suit the local context. The questionnaire consists of 57 items divided into five sections: demographic and academic characteristics (9 items); frequency of searching for information resources (8 items); perceived information literacy skills (26 items); source of learning information literacy (6 items); and barrier in seeking information (8 items). The five sections (section A to section E) are as follows:

- Section A contains demographic and academic characteristics include students' gender, age, ethnicity, previous education, course, academic year, English proficiency, and frequency of searching for article journals. This information was obtained to provide a clear picture of students that have participated in the study.
- Section B is list of items on the frequency of searching for information resources. The students were required to rate the frequency of searching for information resources (electronic journals, printed journals, thesis, electronic books, open-access database, subscribed database, library catalog, and internet search engine) on a scale ranging from "never", "rarely", "sometimes", "often" and "very often ".
- Section C is on information literacy skills. There were 4 domains assessed on information search (8 items), information evaluation (5 items), information processing (6 items), and information communication and dissemination (7 items). The students were required to rate their perceived information literacy skills on a 5-point Likert scale ranging from "1- Strongly disagree", "2- Disagree", "3- Neutral", "4- Agree" and "5- Strongly agree". The possible range of total information literacy scores was 26-130.

The scores were divided into 3 levels. A score between 26-60 indicated a low level of information literacy. A score between 61-95 indicated a moderate level, and a score between 96-130 indicated a high level of information literacy skills.

- Section D consists of items related to sources of learning information literacy which included information literacy courses; self-learning from the internet; workshops organized by the library; friends, parents, or family; mass media, and library web page. A scale range from "never", "rarely", "sometimes", "often" and "very often" were used to indicate the sources of learning.
- Section E is on the barrier to seeking information. The students were required to rate their perceived barriers in seeking information (lack of time, lack of computer skills, lack of familiarity with databases, lack of access to internet use, limited subscription of full texts articles, lack of cooperation of the library staff when searching for information at the library, e-Books resources are mostly outdated; other online information sources from Wikipedia or blogs are easier to comprehend than the information from the journal articles) on a scale range from "never", "rarely", "sometimes", "often" and "very often". One open-ended question was given to capture other possible barriers.

A total of 30 students were involved in the pilot study. The respondents from the pilot study were exempted from the actual study. The approximate time for respondents to complete the questionnaires was about 15 to 20 minutes. The Cronbach's α of the instruments was between 0.83–0.88 in the present study. The study was carried out after ethical approval was obtained from the university research ethic committee (UM. TNC1/400) between June to August 2019. Data were collected for the MBBS, and Biomedical Science students at the Central Point of the Faculty of Medicine, University of Malaya. The researchers approached the students and informed them about the aim of the study. Those who meet the inclusion criteria were invited to participate in the study. The recruitment of nursing students was at the Department of Nursing Science, University of Malaya. All the student nurses were invited to participate in the study because of the small nursing student population. All the participants were informed that their participation in this study was completely voluntary and could withdraw from the study at any time. Those who agreed were required to sign the consent form after a clear and detailed explanation of the study. Their responses were confidential, and no name was required in maintaining anonymity. Students were given an envelope containing the cover page of the questionnaire, the written informed consent sheet, and the self-administered questionnaire which took roughly 15 to 20 minutes to fill up the questionnaire.

A total of 331 students met the inclusion criteria and they were invited to participate in the study. Of these, 315 students returned the questionnaire. The data collected were analyzed using SPSS version 23.0 (Statistical Package for the Social Science Version 23.0). Descriptive data analysis was used to analyze the data. A normality test was done on dependent variables which are the perceived level of information literacy skills. The mean value for a perceived level of information literacy skills was almost equal with a median value (101.00) and a standard deviation smaller than the mean (Mean± SD; 99.80±0.533). The skewness and kurtosis values were between +2 and -2. The histogram of the perceived level of information literacy skills is normally distributed through visual inspection of the histogram, Box-and-Whisker plot, P-P plot, and Q-Q plot. However, the most significant values of Kolmogorov-Smirnov and Shapiro-Wilk were more than 0.05. Thus, all the distributions can be assumed to be approximately normally distributed.

RESULTS

The study yielded a response rate of 95.0 percent. A total of 315 students participated in the study and the demographic and academic factors are shown in Table 1. Of these, more than half were female (69.2 %, n=218), in the 18-21 age group (21.11±1.56) (62.9%, n=198), Malay (57.5%, n=181), entry with Foundation in Science Education (51.4%, n=162), in year 3 (28.6%, n=90), and are MBBS students (67.6%, n=213). A total of 63.8 percent (n=201) of the participants claimed they have a moderate level of proficiency in speaking and using English. In terms of frequency of searching for article journals, 36.2 percent (n=114) of participants reported 2-6 times or more per day.

Table 1: Demographic Information of the Respondents

Demographic	Characteristics	Frequency (n)	Percentage (%)
Gender	Male	97	30.8
	Female	218	69.2
Age (years) (Mean± SD; 21.11±1.56)	18-21	198	62.9
	22-31	117	37.1
Ethnicity	Malay	181	57.5
	Chinese	76	24.1
	Indian	38	12.1
	Others	20	6.3
Previous education	Matriculation	129	41.0
	Foundation	162	51.4
	Diploma	6	1.9
	STPM	16	5.1
	Others	2	0.6
Academic programme	MBBS	213	67.6
	Nursing	50	15.9
	Biomedical Science	52	16.5
Academic year	Year 1	43	13.7
	Year 2	71	22.5
	Year 3	90	28.6
	Year 4	75	23.8
	Year 5	36	11.4
English language proficiency	Excellent	102	32.4
	Moderate	201	63.8
	Poor	12	3.8
Frequency of searching for journal article	Once a week	58	18.4
	2-6 times a week	104	33.0
	2-6 times or more per day	114	36.2

Frequency of Searching for Information Resources

The “very often” and “often” searched information resources was internet search engine such as Google / Bing (93.1%, n=293), followed by electronic books (63.2%, n=199), open-access databases such as PubMed / Google Scholar (61.3%, n=193), electronic journal (58.1%, n=182), Library Catalogue / Pendeta Discovery (26.3%, n=83), a subscribed database such as CINAHL/ EBSCO (27.6%, n=87), printed journals (16.2%, n=51) and thesis (12.1%, n=38).

Perceived Information Literacy Skills

The information literacy scale consists of 26 items with a Likert scale from 1 to 5. The possible lowest and highest total score were 26 and 130. A score between 26-60 indicated

a low level of information literacy. A score between 61-95 indicated a moderate level, and a score between 96-130 indicated a high level of information literacy skills. The total mean score is 99.80 (SD±9.45). A total of 71.4 percent (n=225) and 28.6 percent (n=90) of the students reported they have a high and moderate level of perceived information literacy skills. None of them have low perceived literacy skills. As of the four domains in information literacy, information search tops the rank (30.21±3.614) followed by information communication and dissemination (29.25±3.592), information processing (22.04±2.876), and information evaluation (18.29±2.440).

Table 2 tabulated the distribution of responses to perceived information literacy skills of each domain. It is worth noting that in the information search domain, the proportion of students who reported strongly disagree/disagree/neutral on "search using information search strategies such as Boolean operators" (59.3%, n=187) is relatively more compared to agree/strongly agree. This trend is not observed in items in the information communication and dissemination domain. For the information processing domain, the proportion of students who reported strongly disagree/disagree/ neutral on "use database managers such as Microsoft SQL server and Microsoft Access" (54.3%, n=171) is relatively more compared to agree/strongly agree. Likewise, the proportion of students who reported strongly disagree/disagree/neutral on "know the typology of scientific information sources such as thesis and proceedings" (59.9%, n=189) in the information evaluation domain is comparatively more.

The perceived information literacy skills of the following are also worth attention in referring to the proportion of students who reported strongly disagree/disagree/neutral. In the information evaluation domain, the skill to "identify the most relevant authors and institutions within my subject area" (43.5%, n= 137). Likewise, two items in the information processing domain, skill on the "use bibliographic reference managers such as Endnote or Mendeley" (46.7%, n= 147), and how to "handle statistical programs and spreadsheets such as SPSS or Microsoft Excel" (43.2%, n=136).

Table 2: Distribution of Response to Perceived Information Literacy Skills

Perceived information literacy skills	Frequency, n (Percentage %)				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Information Search					
1. Use printed sources of information such as books, printed journals, and newspapers.	0 (0)	8 2.5)	64 (20.3)	173 (54.9)	70 (22.2)
2. Login and access automated catalogs and databases.	2 (0.6)	12 (3.8)	82 (26.0)	180 (57.1)	39 (12.4)
3. Use electronic sources of primary information which are original documents such as autobiographies or journals.	0 (0)	17 (5.4)	84 (26.7)	166 (52.7)	48 (15.2)
4. Use electronic sources of secondary information such as textbooks or book reviews.	0 (0)	9 (2.9)	47 (14.9)	182 (57.8)	77 (24.4)
5. Know where to search for the terminology of the subject.	0 (0)	8 (2.5)	70 (22.2)	174 (55.2)	63 (20.0)
6. Search for and retrieve internet information through advanced searches and directories.	0 (0)	9 (2.9)	72 (22.9)	165 (52.4)	69 (21.9)

7. Use informal electronic sources of information such as blogs and forums.	5 (1.6)	34 (10.8)	84 (26.7)	163 (51.7)	29 (9.2)
8. Search using information search strategies such as Boolean operators.	14 (4.4)	51 (16.2)	122 (38.7)	103 (32.7)	25 (7.9)
Information evaluation					
9. Assess the quality of information resources from trusted sources.	0 (0)	4 (1.3)	59 (18.7)	197 (62.5)	55 (17.5)
10. Recognize the author's ideas within the text	0 (0)	8 (2.5)	79 (25.1)	190 (60.3)	38 (12.1)
11. Know the typology of scientific information sources such as the thesis and proceedings.	2 (0.6)	30 (9.5)	157 (49.8)	117 (37.1)	9 (2.9)
12. Determine whether the information resource is updated.	0 (0)	14 (4.4)	108 (34.3)	162 (51.4)	31 (9.8)
13. Identify the most relevant authors and institutions within my subject area.	2 (0.6)	32 (10.2)	103 (32.7)	154 (48.9)	24 (7.6)
Information processing					
14. Schematize and summarize information.	0 (0)	8 (2.5)	87 (27.6)	190 (60.3)	30 (9.5)
15. Recognize text structure such as how the information within a written text is organized.	0 (0)	6 (1.9)	88 (27.9)	190 (60.3)	31 (9.8)
16. Use database managers such as Microsoft SQL server and Microsoft Access.	18 (5.7)	52 (16.5)	101 (32.1)	105 (33.3)	39 (12.4)
17. Use bibliographic reference managers such as Endnote or Mendeley.	13 (4.1)	38 (12.1)	96 (30.5)	130 (41.3)	38 (12.1)
18. Handle statistical programs and spreadsheets such as SPSS or Microsoft Excel.	0 (0)	27 (8.6)	109 (34.6)	151 (47.9)	28 (8.9)
19. Install computer programs such as Microsoft Office or PDF reader.	0 (0)	7 (2.2)	41 (13.0)	158 (50.2)	109 (34.6)
Information communication & dissemination					
20. Use email to communicate with others.	0 (0)	4 (1.3)	29 (9.2)	115 (36.5)	167 (53.0)
21. Understand and use other languages to communicate via the internet	0 (0)	0 (0)	39 (12.4)	122 (38.7)	154 (48.9)
22. Write a document such as a report and academic work.	0 (0)	0 (0)	41 (13.0)	137 (43.5)	137 (43.5)
23. Know the code of ethics in my academic or professional field.	0 (0)	9 (2.9)	60 (19.0)	170 (54.0)	76 (24.1)
24. Know the laws on the use of information intellectual property.	0 (0)	13 (4.1)	101 (32.1)	144 (45.7)	57 (18.1)
25. Create academic presentations.	0 (0)	0 (0)	35 (11.1)	124 (39.4)	156 (49.5)
26. Disseminate or spread information on the internet through websites or blogs.	4 (1.3)	11 (3.5)	68 (21.6)	127 (40.3)	105 (33.3)

Source of Learning

The most common (referring to often and very often used) source of learning information literacy was information literacy courses with 74.3 percent (n=234) followed by self-learning from the internet such as from 'YouTube', blogs, or websites 57.5 percent (n=221), workshops organized by the library 49.2 percent (n=155), from friends, parents or family 61 percent (n=192), from mass media such as television, newspaper, magazines,

advertising, or internet 54.3 percent (n=171) and library web page 30.8 percent (n=97). Figure 1 illustrates these findings.

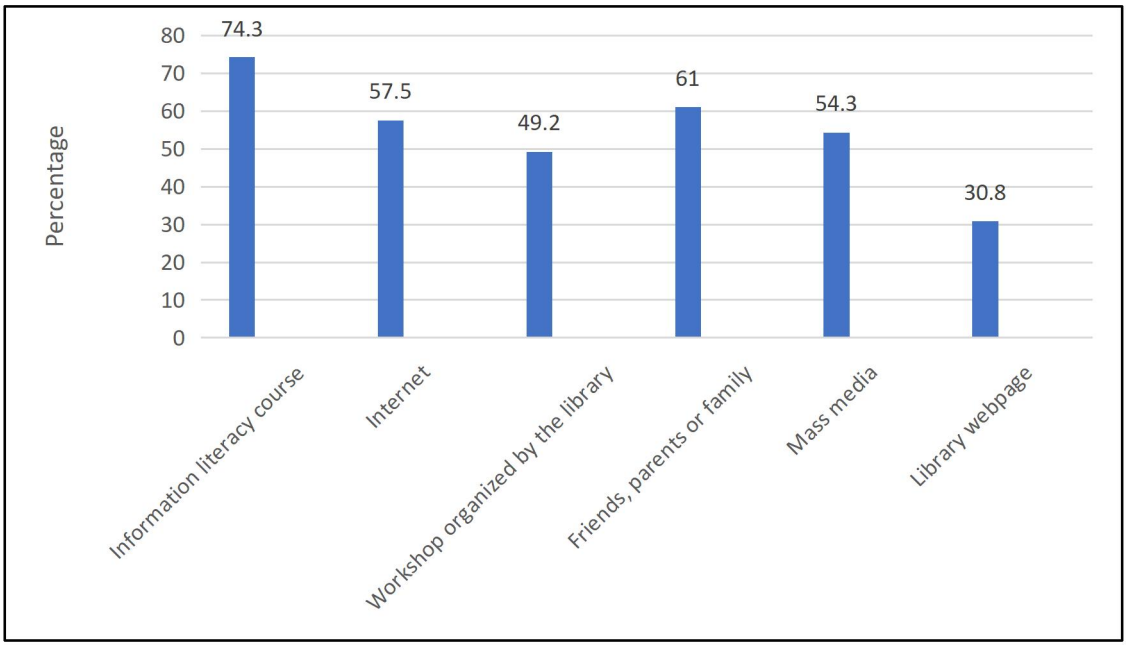

Figure 1: Source of Learning

Barriers to Seeking Information

The most common (referring to often and very often experienced) barrier in seeking information was the limited subscription of full texts article with 53.0 percent (n=167) followed by other online information sources from Wikipedia or blogs are easier to comprehend than the information from the journal articles 45.7 percent (n=144), lack of familiarity with databases 28.2 percent (n=89), e-books resources are mostly outdated 12.4 percent (n=39), lack of time 19.6 percent (n=62), lack of cooperation of the library staff when searching for information at library 4.8 percent (n=15), lack of computer skills 11.5 percent (n=36) and lack of access to internet use 5.7 percent (n=18). Figure 2 illustrates these findings.

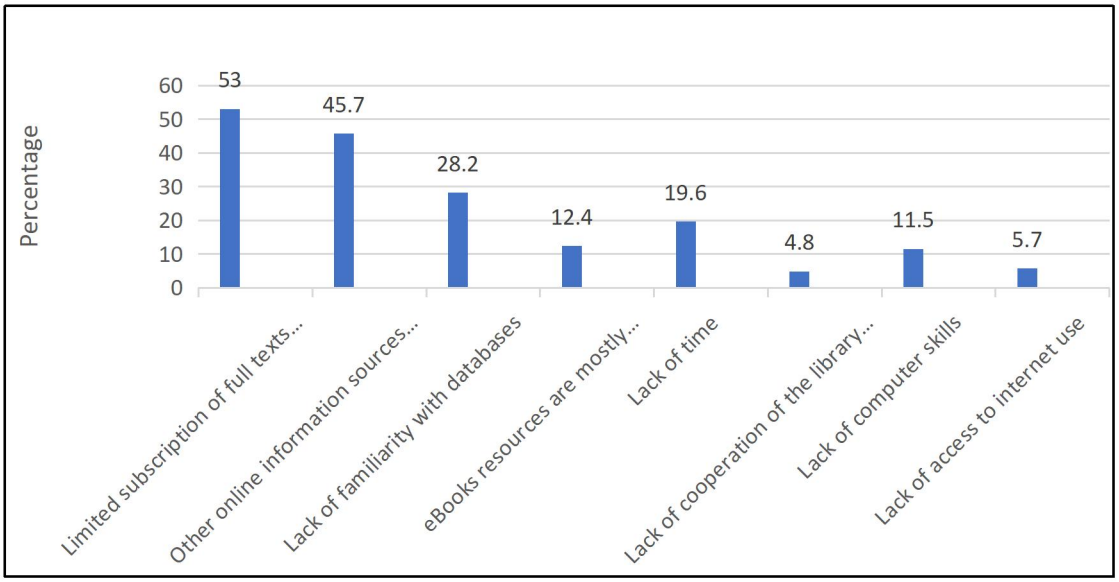

Figure 2: Barriers to Information Seeking

DISCUSSION

The present study revealed that university students in the Faculty of Medicine employed internet search engines as their primary information resources. This might be because the students felt that it is needed for their course subject assignments, and it is much easier to use the internet search engine to search for information than other electronic journals. Our study found a high majority of the students frequently search for information resources through internet search engines by Google / Microsoft Bing and 63.2 percent of them use the internet to search for electronic books. About 61.3 percent of the students used open-access databases such as PubMed / Google Scholar and electronic journals (58.1%) for their courses. Our study findings are similar to a previous study where the web search engine was the top five frequently used or choice sources by the students (Kim and Sei-Ching 2011). Another study by Horvath (2014) also found that internet use was the highest resource used for studies, research, and professional training or courses among first year and second-and third-year students. Contrary to another study by Wong et al. (2018), only a few percent of students used a search engine such as Google or Yahoo, Bing or MSN for sources of references. It is similar to our study, a minority of the students use the internet to search Library Catalogue / Pendeta Discovery (26.3%), a subscribed database such as CINAHL/ EBSCO (27.6%), printed journals (16.2%) and Thesis (12.1%).

The students often used electronic journals and open-access databases even though there were not the top search. This is because of the good quality and accuracy of the information from electronic journals and open-access databases. Kim and Sei-Ching (2011) study reported online databases and online journals were the third highest among the top five frequently used sources. However, this is contrary to the previous study reported by Horvath (2014) there are very few first-year students using PubMed and Google Scholar for studying, work, or research. But an increasing number of second-and third-year students were seen using open-access databases such as PubMed and Google Scholar for studying and research. Apart from that, students rarely used the library catalog (Pendeta Discovery) to search for information. This may be because of the lack of awareness among the students on the use of the library catalog provided by the library. Even though some of the students were aware of the library catalog but they hardly used it to search for information. This finding is similar to another study done by Wong et al. (2017) where most of the students seldom used the Cochrane library which is the collection of databases in medicine and other healthcare specialties provided by Cochrane and other organizations.

The study findings revealed that the students use different search engines and different websites on the internet to search for their information and also communicate with others to obtain relevant academic information.

Perceived Level of Information Literacy Skills

A total of 225 (71.4%) students reported they have a high level of perceived information literacy. A similar finding was shown in a previous study conducted by Mahmood (2013) where the students perceived good information literacy. Although most of the students were reported to have a high level of information literacy, there is still some minority having low perceived information literacy in four domains (information search, information evaluation, information processing, and information communication and dissemination). The mean of every domain increases from information evaluation to information search. This may be because students had higher skills in searching than evaluating the information.

In the information search, some students disagreed and were unsure of using electronic sources of primary information which are original documents such as autobiographies or journals, similar findings from Kleyman and Tabaei (2012) study reported that only half of the students could identify a primary source correctly. This may be because the students could not differentiate between what is primary and what is secondary information. Apart from that, most of the students were unable to search using information search strategies such as Boolean operators. This finding was similar to another study where the students were unsure of how to use the Boolean operators for their information search (Wong et al. 2018). Therefore, education and skills in using Boolean operators strategies should be emphasized to the students.

In information evaluation, the students reported that they were able to assess the quality of information resources from trusted sources. This finding was contrary to previous studies where most students felt that it was difficult to evaluate the quality of information to write their research papers (Kleyman et al. 2012). However, most of the students were unsure if they knew the typology of scientific information sources such as thesis and proceeding. This may be due to a lack of use and awareness of the thesis and updated proceedings or conferences. This finding was similar to a previous study done by Horvath (2014) as the students rarely used conferences or electronic conferences to search for information. Other than that, most of the students disagreed that they could identify the most relevant authors and institutions within their subject areas such as Academia and ResearchGate. This may be because the students rarely use these institutions to search for academic or research information. This result is also similar to Horvath (2014) study, the students reported that they never used ResearchGate or Academia as information sources and sharing.

In information processing, the majority of the students disagreed that they could use database managers such as Microsoft SQL Server and Microsoft Access. These database managers served as a platform to import or link directly to data stored in other applications and databases. This may be due to a lack of awareness and skills in using these database managers. Furthermore, the students were also unable to use bibliographic reference managers such as Endnote or Mendeley. This may be because the students are still using manual ways of writing references instead of using the reference managers software. Similar research findings from Mahmood (2013) also showed that the students lacked information literacy skills in terms of using specific resources and search methods. The students reported that they were less confident making bibliographies or reference lists for research or assignment.

In information communication and dissemination, many students were unsure of the rules on the use of information intellectual property. Students may be unsure and at the same time, they were also not aware of the laws and acts of intellectual property such as copyrights, patents, and trademarks. Students felt it is not important to know about it since it is not their main objective in their field of study. However, the students should know how to use the information legally and ethically. A finding from a previous study showed that most of the students did not know how to use information legally and ethically. This includes how to cite journal articles, in-text citations, how to avoid plagiarism, and when the copyright law is infringed (Dorvlo 2016).

From the findings in our study, we can conclude that if the students can use the information literacy skills well and correctly, it will help them to search for their academic and research information easily in a very short time.

Source of Learning

The findings of this study showed that most of the students (43.5%) attended information literacy courses to learn information literacy. This may be because students are expected to attend compulsory courses in information skills at university. This is important to provide the database or journal articles searching skills and information literacy courses that will be offered for the new students. These prepared the students how to search for information or journal articles which are needed for their assignment and further readings. Our study findings were contrary to a previous study done by Horvath (2014), a minority of the first, second and third-year students rated courses and information seminars as sources of studies, research and profession. However, the students were interested in information preparedness courses if the library offered the course. Other than that, only 8% of the students learned information literacy from courses (Pinto 2011).

Apart from that, our study reported about 57.5 percent of the students are self-learning from 'YouTube', blogs, or websites. This may be due to the vast amount of information available on the internet and the students can easily get access to the information. The students must be competent in using a computer and searching databases, articles journals, and other information skills which will allow them to search all the information or journal articles easily and fast when needed for their assignment or reading. A similar finding to our study is from Pinto's (2011) study which found that half of the students learned information literacy through self-learning. However, some concerns have arisen about the source quality as the students may get information from Google without checking the quality of the information. Therefore, guidance regarding how to choose good quality information should be given to the students. This is important to ensure the students get quality and accurate information.

The least common source of learning used by the students was from the library web page (30.8%). This may be because the students rarely frequent library web page to get their wanted information. This finding was similar to a previous study done by Horvath (2014) where only a few first-year students use web or library portals to look for specialized information. However, this is contrary to second-and third-year students as many of them used web or library portals. The library should provide more important and wanted information on the library web page to attract more students to seek information for the library web page. It helps the students to search for their information freely without paying subscription fees.

Barriers to Information Seeking

Our study showed that 53.0 percent of the students faced difficulty in seeking information due to the limited subscription to full-text articles. This may be because many articles need to be subscribed to with expensive payment by the students if they want to get the full text of the articles. The majority of the students are unemployed, and they cannot afford to subscribe to their wanted articles for further reading. Our study finding is similar to a study conducted by Wong et al. (2018), in their study found that the students are often unable to subscribe to the full text of the journal articles according to their needs. Furthermore, the library didn't subscribe access to the journals and this becomes one of the main barriers for the students to seek information online and also influence the students' choices in selecting information resources.

Apart from that, 45.7 percent of the students felt that it was much easier to comprehend information sources from Wikipedia or blogs than seeking information from journal articles. The shifting seeking information from full-text journals to Wikipedia or blogs limited their

choice of seeking and selecting their wanted information. However, this finding was different from the previous study done by Wong et al. (2018), where they reported students felt online information sources were not easier to comprehend than information from journal articles. This might be due to the lack of information search skills. The librarian in the library plays an important role to provide their service in helping the students how to search journal articles online based on their student's needs. A special workshop can be organized by the library to help the students in this matter, especially for the new intake students.

Another important barrier that should be highlighted in our study is the lack of familiarity with a database search. A total of 28.2 percent of the students reported it was difficult for them to search for information as they were not familiar with the databases which were provided by the library. A similar finding from a previous study by Kim and Sei-Ching (2011) was found where the distance between familiarity and Online Public Access Catalogue (OPAC) or database had an important implication for information literacy education. The students were not familiar with OPAC and databases so a one-time training session provided may not be effective. Therefore, many sessions of database search training should be provided by the library to help the students to search for their journal articles, e-books resources, or other information easily.

In our study, a minority of the students reported they lack cooperation from the library staff or librarian when searching for information at the library (4.8%). The librarian was unable to give full cooperation to the students due to their incompetency in database search skills. Some of the students were weak in computer skills which causes them unable to search the database or information that was important to them (11.5%). Furthermore, there is also a lack of access to the internet use (5.7%) in the university. The university can overcome the shortcoming by asking the expert to train the librarian or database searching skills and also improve the internet access services.

Our study is aimed to assess the frequency of searching for information resources, sources of learning of information literacy, and the barrier to seeking information among undergraduate students in the Faculty of Medicine. This study was recruited at a single faculty and directly limits the ability to generalize the results to present for other faculties and universities. Therefore, a bigger number of students from different faculties and universities are needed for future study to present the whole student population.

CONCLUSIONS

Most students frequently search for information resources through internet search engines. The students may face difficulty in searching academic or research information due to the limited subscription of full-text articles from the university library. Indirectly, this might affect the students to use the easier platform to search for information such as Google or Microsoft Bing. Overall, our study found that the students have a high perceived level of information literacy. The students should be encouraged to obtain online information from trusted resources such as library online subscribed databases. At the same, students must advance their literacy in information processing and information evaluation. Our study findings also provide evidence to organize information literacy workshops to help and guide the students in the information database search.

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AUTHOR DECLARATION

This study had been approved by Universiti Malaya Research Ethics Committee (UMREC) with the code of UM.TNC1/UMREC_400. The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request. The authors confirmed that there are no known conflicts of interest associated with this publication.

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